REMARKS

Claims 2-4, 14-15, and 17-24 were pending in this application and all stand rejected. By virtue of this response, Claims 2, 19 and 23 have been amended.

Rejections

Claim 23 stands rejected under 35 U.S.C. §101 as directed to a computer program which the Examiner states is non-statutory subject matter. In response, Claim 23 has been amended and as amended is believed to be directed to statutory subject matter, hence this rejection is overcome.

Claims 17-19, 23 and 24 stand rejected under 35 U.S.C. §103 as unpatentable over Kornish in view of Blinn and further in view of Koshiba.

Claim 2 stands rejected as unpatentable over Kornish in view of Blinn and Koshiba and further in view of Cortis.

Claims 3 and 20-22 stand rejected over Kornish in view of Blinn and Koshiba and further in view of Klassen.

Claim 4 stands rejected under 35 U.S.C. §103 as unpatentable over Kornish and Blinn and Koshiba and Cortis and further in view of Govindaraju.

Claims 14 and 15 stand rejected under 35 U.S.C. §103 as unpatentable over Kornish in view of Blinn and Koshiba and Cortis and further in view of Van Wijk.

Other Claim Amendments

Claim 19, which is the sole independent claim, have been amended here to read more closely in its penultimate clause on paragraph 7 of the specification which states "In another embodiment of the invention, the cutout particles are generated using a depth map for the geometry image. The depth map is obtained, for example, from the rendering of the geometric image. Because the depth map includes a plurality of entries that each indicate a distance to a nearest geometric object from a camera position in a particular direction, the cutout particles can be generated from the entries in the

depth map, where each cutout particle corresponds to an entry in the depth map in three-dimensional space". (Emphasis added.)

Hence the final two clauses of Claim 19 as amended now recite "computing a depth map having a plurality of entries for the second image; and generating a cutout particle from at least some of the entries in the depth map, each cutout particle having a position and radius in three-dimensional space corresponding to one depth map entry".

Further, a clause has been added here to Claim 19 referring to "compositing..." and which reads on the specification paragraph 5, line 8; paragraph 24, lines 4-5; and FIG. 3 element 360.

Claim 20 dependent upon Claim 19 has been amended to put it in better form and to eliminate the final clause of Claim 2, which it is believed is now redundant with regard to base Claim 19.

Present Method

In accordance with the present method, there is disclosed a way to z-composite using pixel coverage. Thereby one automatically selects the correct mode for occlusion particles which involves masking, and for non-occlusion particles which involves alpha blending, for compositing purposes. This renders the z-depth map as masking (cutout) particles, where all other particles are blended using alpha blending. Thereby in accordance with the invention, the depth map entries are used as particles, where typically in the prior art the depth map entries are pixels. This prior art results in relatively lower image quality, whereas the present approach provides a higher quality image, useful for feature film production. In accordance with the invention, one is able to use the depth map entries as particles and so thereby one can composite particles with a geometrically rendered image layer. The high quality resulting in accordance with the present method provides alias-free compositing, aliasing being the well known image defects present at the edges of objects.

References

The Examiner stated in pertinent part in the rejection of Claim 19 at the top of page 5 of the Action:

> Blinn also teaches computing a depth map for the image (col. 20 lines 30-31), where depth values for the pixels in the image are calculated, and also teaches computing particles for entries from a depth map at a particular depth (col. 1 lines 42-43...and col. 15 lines 35-40..., where the particles have a position in three-dimensional space corresponding to a z value, or depth map entry (col. 9 lines 5-8). However, Cornish and Blinn fail to teach the remaining limitations. Koshiba teaches a particle having a radius in three-dimensional space (Fig. 4: element "r_1") corresponding to a z value, or depth map entry (col. 13 lines 22-23) in 3D space. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of Cornish, Blinn and Koshiba because this combination would provide accurate rendering of composited particles at a correct depth in the scene through the determination of the color associated with the visible pixels based on the depth and position of the particle in 3D space...

First, it is pointed out that the Examiner's combination of Koshiba with the other references is not well supported. Koshiba is in the field of simulation, but otherwise bears no particular relationship to the other references in terms of the technical problem or technical field. As pointed out in the title of Koshiba, this is directed to a "virtual clay system and its method of simulation". Koshiba is not directed to animation, but instead to simulation for designing a product, see column 1 lines 12 and following "to clarify the image of a product a designer often produces a model of it in the designing process of a product".

Hence Koshiba is directed to three-dimensional modeling software, see lines 34-39, which is not the same as animation and requires different approaches. Especially of course Koshiba's sort of simulation does not require the compositing and rendering used in animation. For instance, there would be no need in Koshiba to combine one image with another image, which is what Claim 19 is directed to, see preamble of Claim 19 "A computer-implemented method to produce a particle image to be combined with a second image for animation".

While other of the references such as Blinn are indeed directed to animation, that is not the case with Koshiba and hence the combination of Koshiba with the other references is not believed to be well supported by the Examiner's stated reasons. While Koshiba teaches that particles are located in three-dimensional space, this is not for purposes of animation in the sense of Kornish and Blinn and there would be no need to render or composite anything in Koshiba since rendering and compositing are not part of his modeling approach.

The Examiner's stated reason for combining Koshiba with the other references, see page 5 of Action, is "this combination would provide accurate rendering of composited particles at a correct depth in the scene through the determination of the color associated with the visible pixels..." (emphasis added). However, Koshiba is not dealing with "rendering" or "composited" or "depth" or "color". There appears to be no mention of any of these in the passages of Koshiba cited by the Examiner, or elsewhere in Koshiba. Koshiba is a "virtual clay" system, for modeling of shapes without apparently reference to color or to compositing of images. Hence the Examiner's stated reason for the combination is inadequate since it does not pertain to Koshiba. Instead Koshiba is directed to the determination of a plasticity of the modeled material and generating different shapes from it, where "color" and "depth" do not appear to be a part of the process. Neither does compositing nor rendering, also cited by the Examiner, have anything to do with Koshiba, which is simply a modeling method.

Therefore first, the combination of Koshiba with the other references is not adequately motivated or explained and hence the rejection fails on that basis alone.

With regard to Cornish, this is not a particularly pertinent reference. Cornish is clearly directed to non-photo realistic imaging. In accordance with the present invention however photo realistic imaging is presented, which is the opposite. Cornish is intended for use of computer animation to produce what appear to be hand drawn cartoons. Of course in this case image quality is not an issue. The possible relevance of Cornish is that he does use particles in a depth map layer to prevent occlusion, but this is a well known use of cutout particles.

Moreover in Cornish there is no compositing aspect. The Examiner when he stated on page 4 of his Action "Cornish also teaches displaying the composited image on a display..." is incorrect. There is no compositing at all in Cornish. Cornish is only concerned with showing a single character, for instance the illustrated rabbit. This object is not composited with anything else. Hence Cornish is not particularly pertinent.

Blinn is somewhat more pertinent because it describes use of fog simulation for partially transparent objects and does use a particle system in this regard. However in Blinn there is no compositing of the fog with any other objects. Blinn only discusses the actual fog imaging. It would be possible to composite the fog of Blinn with other objects, but Blinn does not describe how to do so without causing undesirable artifacts such as edge aliasing. In that respect, Blinn is likely suitable for lower quality images such as used in computer games, but not for high quality feature film type production. A naive approach in Blinn (although not disclosed therein) to reduce aliasing would be to increase the resolution. However this will still result in quality problems such as motion blur and still would not provide adequate quality.

Therefore even in combination Cornish and Blinn and even Koshiba fail to show the compositing aspect referred to above in accordance with the invention.

Claim 19 Distinguishes Over the References Even in Combination

First, as pointed out above the use of Koshiba is not justified since there are not adequate reasons provided for combining Koshiba with the other two references. However even if arguendo all three references are combined, still even the combination fails to meet Claim 19 as amended. Note that Claim 19 has been amended here to recite the compositing step. (This was implicitly recited before because Claim 19 as originally filed recited "displaying the composited image on a display;".) Claim 19 as amended now recites "compositing each of the cutout particles with other particles of the particle system by alpha blending;". Thus in accordance with the invention and as explained above there is the resulting advantage to select the correct mode for compositing. The occluded (cutout) particles are subject to the depth map and the occlusion. The remaining particles

are subject to the conventional alpha blending. This compositing is useful in achieving adequate image quality for use in feature films or other situations where high quality animation is needed.

As pointed out above, neither Cornish nor Blinn disclose compositing at all. Cornish deals only with the character object (rabbit), Blinn deals only with the background (fog). Neither deals with compositing, indicating that the compositing if any would be conventional. However as pointed out above, conventional compositing would not be useful in providing high quality imaging since it would result in aliasing and other undesirable artifacts if used with the Cornish and Blinn methods.

Hence the present method advantageously results in z-compositing with pixel coverage providing high quality images; this is not achievable even with Cornish, Blinn, and Koshiba in combination. Hence the present method clearly distinguishes thereover, so Claim 19 is allowable thereover.

Hence Claim 19 distinguishes over the references first because the combination of Koshiba with the other references lacks adequate reason or suggestion in any of the references or elsewhere in the prior art and second, Blinn and Cornish and Koshiba fail to meet Claim 19 even if combined.

Hence Claim 19 is allowable.

The dependent claims are all allowable for at least the same reason as base Claim 19.

CONCLUSION

In view of the above, all presently pending claims in this application are believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejection of the claims and to pass this application to issue. If it is determined that a telephone conference would expedite the prosecution of this application, the Examiner is invited to telephone the undersigned at the number given below.

In the event the U.S. Patent and Trademark Office determines that an additional extension and/or other relief is required, Applicant petitions for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to **Deposit Account No. 03-1952** referencing Attorney Docket No. 590282001100.

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Respectfully submitted,

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